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Glazing panels sealed together

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(NON-CONVENTION. One or more persons.)

Form 7

COMMONWEALTH of AUSTRALIA

Patents Act 1952-1969

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT OR PATENT OF ADDITION

(1) Here insert (in full) Name of Applicant or Applicants.

In support of the Application made by[1] James Arthur Albert Hickman

(2) Here insert title of invention.

for a Patent for an invention entitled:[2] Lamination of glazing panels

I[1] James Arthur Albert Hickman

(3) Here insert (in full) Address or Addresses.

of[3] 14a Seaforth Drive, Edinburgh, Scotland, United Kingdom

do solemnly and sincerely declare as follows:

1. I am the applicant for the patent.
2. I am the actual inventor of the invention.

or

(4) Here insert full Name(s) and Address(es) of Actual Inventor(s) if other than Applicant.

2.[4]

the actual inventor of the invention, and the facts upon which I am entitled to make the application, are as follow:

(5) Full Name of Actual Inventor or Inventors.

I am the assignee of the said[5]

DECLARED at 14A Seaforth Drive, Edinburgh

this Fifteenth day of January 1987

(6) Signature of Applicant or Applicants.

[6] James Arthur Albert Hickman

(James Arthur Albert)

Form 10

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PATENTS ACT 1952-69

COMPLETE SPECIFICATION

(ORIGINAL)

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Complete Specification Lodged:
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This document contains the amendments made under Section 49 and is correct for printing.

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Complete Specification for the invention entitled:

LAMINATION OF GLAZING PANELS

The following statement is a full description of this invention, including the best method of performing it known to :- ME

For example a glass ceramic panel is normally manufactured by fusing as a given temperature coloured or painted glass on to a clear, obscure or coloured flat panel to form a design-bearing or decorative glazing panel. A non-glass decorative ceramic panel can be formed in a similar manner.

A leaded glazing panel is normally considered to be a glazing panel, constructed of small panes of coloured or clear glass, built into lead cames, which hold each individual pane in position to form an overall pictorial scene or design.

A disadvantage of known leaded, stained or decorative glass or glazing panels is that they deteriorate in quality when exposed to the atmosphere, either because of the climatic elements and atmospheric conditions or because they become dirty and are difficult to clean. In addition such glazing panels are often not structurally strong, for example leaded glass is inherently weak due to its very method of construction in which separate pieces of glass are fitted into lead cames. Also it is difficult, at least with leaded glazing panels, to produce multiple, e.g. double, glazing units since the conventional glazing panels are not air-tight.

The present invention seeks to overcome one or more of the disadvantages referred to above associated with known leaded, stained or decorative glazing panels.

~~According to one aspect of the present invention~~ a method of producing a laminated glazing unit comprises introducing an (exothermically) setting liquid resin material between a first glazing panel and a leaded, stained or decorative second glazing panel arranged in face-to-face relationship and sealed together around at least part of their peripheries in a liquid-tight manner and ~~allowing the liquid resin material to set.~~

The present invention thus enables the production of a laminated leaded, stained or decorative glazed panel. Such glazed panels are desirable for a number of reasons. Firstly a first glazing panel laminated to a second, leaded, stained or decorative panel, serves to protect the second panel. For example when the first glazing panel is on the outside of a window it protects the second leaded, stained or decorative panel from climate elements and atmospheric pollution. Additionally some resin material will provide a complete barrier to the transmission of ultra violet light, which is vitally important to materials used in stained or leaded panels, which are effected by ultra violet light with subsequent loss of colour. Furthermore external cleaning of such a glazing unit is rendered much easier than is the case with an unlaminated panel, where the lead cames, stained glass or decorative design are exposed either externally or internally. For instance with unlaminated leaded glass, it is impossible to keep leaded panels adequately clean and as a result they suffer from gradual degradation of colour and clarity. Similar effects are experienced with unlaminated stained and decorative glasses to a greater or lesser degree depending on their site location. However laminating or resin bonding stained or decorative glazing panels, with the decorative or stained glass to the inner face of the lamination if the panel is only decorated or stained on one face or with laminating on both sides if the glazing panel is stained or decorated on both its sides, provides a total barrier against normal ensuing deterioration. Similarly with a laminated leaded glazing panel, the second glazing panel may be laminated on one face or on each side of the leaded panel, as desired for protecting the glazing unit. Finally the structural strength of a glazing panel can be greately improved by laminating. For example a laminated leaded glazing unit has far greater structural strength than an unlaminated unit which is inherently

glazing panels is controlled so that the temperature of each glazing panel does not exceed 27°C. Typically cooling of the glazing panels, continues for at least two hours, e.g. 4 hours, after the liquid resin material has been introduced between the glazing panels. Cooling of the glazing panels is preferably by means of gas, e.g. air, cooling although liquid, e.g. water, cooling is also possible. Depending on the design and size of the glazing panels used it is possible to cure the panels without cooling, although an element of risk of damage to the panels is involved.

If the second glazing panel is a leaded glazing panel it preferably comprises a number of glazing panes held together by lead cames. In this case, the glazing panes are preferably sealed, e.g. by transparent silicone material, against resin leakage prior to arranging the glazing panels in face-to-face relationship. It is possible, when a leaded glass panel is to be laminated, for a special cement or sealant to be used in the channels of the lead cames holding the glass to prevent air or resin leakage. The lead cames of the second glazing panel are suitably cleaned and primed with a suitable primer or bonding agent prior to the glazing panels being arranged in face-to-face relationship. This serves the purpose of ensuring that the peripheral seal (e.g. of silicone) and the resin material adhere to the lead cames. This is particularly important for ensuring good adhesion of the resin material to the lead during expansion and contraction which occurs during the curing of the resin material. The peripheral seal can suitably be formed by solid adhesive tape, silicone sealant or a combination of both although other suitable sealant or material, sufficient to prevent leakage, either with or without peripheral pressure may be provided for the peripheral seal.

~~According to another aspect of the present invention~~

~~there is provided a laminated glazing unit made by the~~ method of said one aspect of the invention.

According to a further aspect of the present invention a multiple, e.g. double, glazing unit comprises two spaced apart glazing panels defining a hermetically sealed cavity therebetween, one of said spaced apart glazing panels comprising a laminated glazing unit made by the method of said one aspect of the invention. Heretofore it has not been possible to produce a leaded double glazing unit because a hermetically sealed cavity could not be obtained because of the nature of known ~~leaded or stained glass panels which were not airtight.~~

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, in which:

Figure 1 is a partial sectional view of a laminated leaded glazing unit according to the invention,

Figure 2 is a schematic view of a step in the manufacture of the glazing unit shown in Figure 1, and

Figure 3 is a schematic view of a step in the manufacture of a different glazing unit.

A laminated glazing unit 1 (see Figure 1) comprises a first glazing panel 2, typically transparent float glass, a leaded second glazing panel 3 and a set, preferably transparent, resin material 4 between the panels 2 and 3. The leaded second glazing panel 3 comprises a frame 5 of lead cames 5a supporting a latticework 6 of narrower lead cames 6a, the lead cames 5a and 6a providing a framework into which a plurality of glazing panes 7, e.g. clear or coloured stained diamond or square shaped glass panes, are cemented.

onto non-adhesive release or covering paper already present on the adhesive face of the tape, the release paper being peeled off the adhesive tape 9 and the glazing panels 2 and 3 pressed firmly together after the glazing panel 3 has been accurately positioned relative to the glazing panel 2. The tape 9 between the glazing panels 2 and 3 provides a liquid-tight barrier around the peripheries of the panels 2 and 3. Alternatively it is possible to assemble the glazing panels in a face-to-face relationship by means of holding the panels apart at their peripheries with small wedges at intervals, as desired, then sealing the resultant gap with silicone or similar sealant, removing, after the sealant has set, the wedges, filling the gaps vacated by the wedges with silicone or similar sealing material and allowing this material to set before resin filling. It is also possible for perimeter sealing to use other adhesive materials such as polysulphide, butyl, polyisobutylene, hot melt materials and most materials used in the construction of double glazing units. In addition, it is possible to use solid and semi-solid materials which have a highly adhesive surface.

It is important, however, to leave a gap or opening in the peripheral seal to provide a filling opening 10 for the introduction of laminating resin material. The filling opening 10 may also serve as a hole for excavation of air during and after the introduction of the laminating material. However at least one additional or alternative air hole may be provided for this purpose. If the tape 9 is gas permeable, the air evacuation holes may be omitted.

Since the tape 9 was applied slightly inwardly of the peripheral edge of the frame, a channel shaped peripheral recess exists outwardly of the tape 9 between the glazing panels 2 and 3. This peripheral recess

pense. Catalysts are added to the selected resin, suitably at ratios of from 100:1 by volume to 100:0.5 by volume. However, these ratios are only an approximate guide and can be substantially altered to affect clarity, strength and curing rate of the resin material. The resin and catalysts can also be mixed at the above ratio by special mixing machines and dispensed or injected into the entry funnel or opening. Typically the viscosity of the liquid resin material during pouring is less than 5 cSt, e.g. 3.1 cSt, at 20°C although effective pouring can be obtained at higher viscosities of, for example, up to 25 cSt at 20°C.

The actual pouring of the prepared resin material into the interspace 14 between the panels 2 and 3 should be performed with great care to minimise the creation of air bubbles in the interspace. However, because of the construction of the leaded glazing panel 3 and the irregular contours inside the filled interspace 14, there are normally a large number of air bubbles trapped behind the lead cames. To displace these bubbles, the glazing panel assembly is raised into a vertical position and each air bubble is carefully moved or displaced by vibrating the panel assembly and by tapping the glazing panels 2, 3 at each air bubble location until all the air bubbles have been displaced to the top of the resin material. The panel assembly is then lowered into a horizontal position and air from the air bubbles is evacuated through the air holes or the filling opening 10. When all the bubbles have been evacuated, the air holes and filling opening 10 are carefully sealed with mastic. If any air bubbles remain after sealing they can be removed through the tape by means of an air vacuum pump, syringe or other well known types of air extractor.

The panel assembly is now ready in the horizontal

peripheral sealing mastic; but the quality of the finished product is uncertain and may be of an unacceptable standard. The preferred method described produces consistent quality results. It is also possible to colour clear leaded panels, by colour tinting the resin as desired before its introduction between the panels to be bonded.

In an alternative embodiment, a special resin filling funnel 20 (see Figure 3) is left in the filling opening 10 during setting of the resin material. Such a funnel 20 is used when it is deemed that because of size and calculation of the resin, unacceptably large forces would act upon the leaded glass panel. In this case the resin material is poured through the funnel 20 to fill the interspace 14 and also partly to fill the funnel 20 and the panel assembly is left in a resin setting position. This enables the introduced resin material, when beginning expansion on the commencement of the cure, to push surplus resin material up or out of the funnel 20, removing any stress on particularly the leaded glass panel. Similarly when the resin curing progresses, contraction begins and the required amount of resin is then drawn back into the funnel via the filler, again minimising any stress. When this phase has been completed, the funnel 20 is removed and the filling opening 10 is sealed. This method of allowing the resin material to expand and contract freely, is only possible with resin material, such as the methacrylate resin described herein, which will not cure when exposed to air, therefore permitting free rise and fall within the expansion filler or funnel.

Arising from the lamination of leaded glass panels, it is now possible, for the first time, to successfully manufacture a leaded glass double glazing unit to an acceptable standard. The construction and benefits

reference to leaded glazing units. However, it is also applicable to laminating or resin bonding stained or decorative glass.

Stained glass normally comprises clear or coloured glass having a picture or design painted, stained or transferred onto the glass and subsequently fired or fused into or onto the glass. Such stained glass can be incorporated, but not always, in a leaded panel. Some imitation stained panels are only painted onto the surface without further heat or light exposure treatment, to provide permanency. Stained glass or imitation stained glass panels can also be constructed or manufactured as mock leaded panels by applying adhesive imitation lead cames to one or both faces of the stained or imitation stained panels in a design or pattern to suit the pictorial element. A leaded effect can also be achieved by fusing suitable materials onto clear or obscure glass or by simply painting the glass to effect a leaded design. Similarly clear glass can have the mock lead adhesive cames applied to either or both faces to provide a mock clear leaded panel. All these types of panels can be laminated or resin bonded in a similar manner to that described.

Decorative glass normally has a design or pictorial scene, formed thereon by, for example sandblasting, acid etching or embossing screen printing or print or picture transfer. In this way designs, such as floral or other patterns, pictorial scenes or repetitive designs are formed over the glass. All glass which has been sandblasted, acid etched or had various types of print or picture transferred thereon, must be treated before laminating or resin bonded in the manner described. Whereas in the laminating of stained and most imitation stained glass panels the resin has no effect on the colour portions of the panel, on a decorative panel

CLAIMS

5. A method according to claim 4, characterised in that the first and second glazing panels are peripherally sealed by strip material sandwiched between the peripheries of the first and second glazing panels and in that said unsealed upper peripheral portion is sealed after introduction of the liquid resin material.

6. A method according to claim 5, characterised in that the said strip material comprises double-sided adhesive strip material sandwiched between the glazing panels.

7. A method according to claim 1, characterised in that said cames are lead cames which are cleaned and/or primed with a primer or bonding agent prior to arranging said first and second glazing panels in face-to-face relationship.

8. A method according to claim 6, characterised in that the glazing panes retained by the lead cames are sealed to prevent leakage of the resin material during the laminating process.

9. A laminated glazing unit comprising a first glazing panel, a second glazing panel and a resin interlayer between the first and second glazing panels formed by introducing resin material in liquid form between the first and second glazing panels and allowing the resin material to set between the glazing panels, characterised in that the second glazing panel comprises a leaded glazing panel having glazing panes held together by cames.

10. A laminated glazing unit comprising a first glazing panel, a second glazing panel and a resin interlayer between the first and second glazing panels formed by introducing resin material in liquid form between the first and second glazing panels and allowing the resin material to set

DRAWINGS